



Missouri Water Resources Plan Interagency Task Force (IATF) Meeting Notes – Final

Date: Tuesday, November 28, 2017, 9:00 a.m. to 12:00 p.m.

Location: Missouri Department of Natural Resources, Lewis and Clark State Office Building
1101 Riverside Drive, Jefferson City, MO 65102-0176

Attendees:

Name	Organization
Flynn, Danny	Well Installation Board
Helton, Michele	Tyson Foods, Inc.
Holloway, Leslie	Missouri Farm Bureau
Steen, Darrick	Missouri Soybean and Corn Growers Association
Tesreau, Kerri	Missouri Department of Health and Senior Services
Cantrell, Denise	Senator Wieland’s Delegate
Megaro, Kaely	US Army Corps of Engineers – Kansas City District
Grothaus, John	US Army Corps of Engineers – Kansas City District
Beydler, Hylan	Missouri Department of Natural Resources
Hoggatt, Jennifer	Missouri Department of Natural Resources- Water Resources Center Director
Buntin, Dru	Missouri Department of Natural Resources-Deputy Director
Prewett, Jerry	Missouri Department of Natural Resources
Walsack, Phil	Burns & McDonnell
Funkhouser, Jaysson	US Army Corps of Engineers – Little Rock District
Gillman, Joe	Missouri Department of Natural Resources
Sampsell, Todd	Missouri Department of Conservation
Kaden, Scott	Missouri Department of Natural Resources
Hunt, Rob	Missouri Department of Natural Resources
Luebbering, Cody	Geosyntec
Holmes, John	Allstate Consultants
LeRoy, Emily	Missouri Department of Agriculture
Hopkins, Bryan	Missouri Department of Natural Resources
McCluskey, Mark	CDM Smith
Speake, Penny	Missouri Public Utility Alliance
Galbraith, Ed	Missouri Department of Natural Resources
Morea, Sue	CDM Smith
Stoner, Sherri	Missouri Department of Natural Resources
Mosher, Jackie	CDM Smith
Archer, Todd	CDM Smith
Scott, Matt	CDM Smith

Missouri Water Resources Plan Interagency Task Force Meeting Notes – Final

Meeting Notes:

Introduction by Carol Comer, Director of the Missouri Department of Natural Resources (Slide 1)

Dru Buntin, Deputy Director of the Department of Natural Resources (Slide 2)

- The Water Resources Plan will present and analyze long-term challenges on water availability in the State.
- Personal experience working on Mississippi River, Upper Watershed development.
 - Continued challenges include lack of information to provide legal standing for defending Missouri's water.
 - The Water Resources Plan can be a technical basis to serve as evidence for legal standing and thus is an important exercise for us.
 - The plan will also produce a framework for the State regarding water planning moving forward.

Jennifer Hoggatt, Water Resources Center Director of the Department of Natural Resources (Slide 2)

- New to role as director.
 - Looking forward to working with this group; expressed gratitude for everyone's participation.
 - The intent of the Water Resources Plan is that it be the State's plan, not the Department's plan.
- Today's meeting will provide a background of the Water Resources Plan and its goals and objectives.
 - The first round of technical workgroups was convened two weeks ago.
 - From this point forward, the workgroup teams will be getting into the "meat" of the plan.
 - Asked for feedback from IATF on the goals, objectives, and plan moving forward.
 - Products and deliverables will be presented at subsequent meetings.

Attendees went through roundtable introductions (Slide 3)

Water Resources Plan Background (Slides 4 and 5)

- An update to the Water Resources Plan is established per state statute.
- The plan is not regulatory and it serves a planning function.



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Project Vision (Slide 6)

- Who has and who will have water needs?
- Demands will be calculated for both current conditions and for future scenarios into 2060.
- Shortfalls in supply and ability to deliver water will be identified and addressed.

Project Goals (Slide 7)

- Obtain and incorporate stakeholder input.
- Understand water needs and supplies.
- Establish technical workgroups and IATF.
- Analyze and project water quality as it affects water supplies.
- Identify challenge areas.

Water Resources Plan Schedule (Slide 8)

- The schedule calls for multiple concurrent tasks.
- Stakeholders will be involved throughout the process.
- The schedule calls for a draft plan to be provided by Fall 2019 to the state legislature.
 - Leslie Holloway: Who will perform Agricultural Demands analyses?
 - Sue Morea: Noted that University of Missouri is leading this effort for the Water Resources Plan.

Kaely Megaro, Project Manager for the U.S. Army Corps of Engineers (Slides 9 and 10)

- Section 22 of the Water Resources Development Act of 1974, as amended by Section 205 of the 1992 Water Resources Development Act, created the Planning Assistance to States (PAS) program, which authorizes USACE to assist States on water-related issues.
- Planning Assistance to States program funds studies, but does not provide authorization to design or build infrastructure.
- State planning is a great investment.
- The cost share with the State is 50/50.
- The annual program ceiling is \$30 million and the maximum funding per state is \$5 million.
- The Kansas City District is working with the Little Rock District to support the update of the Water Resources Plan.

Sue Morea, CDM Smith Project Director (Slide 11)

- Presented the organization chart and explained the roles of the project team. (Slide 12)
- CDM Smith brings 20 years in state water resources planning experience; previous/ongoing plans include Oklahoma, Colorado, Arkansas, Connecticut, and West Virginia.

Core Elements (Slides 13 to 15)

- Reviewed the Water Resources Plan core elements, developed by the Department, U.S. Army Corps of Engineers and CDM Smith last year.
- Water quality included as it impacts water supply and is needed to help with the infrastructure task.



- For the adaptive management element; high, medium, and low scenarios for demands and average, wet, and dry scenarios for the supply analysis will be performed.
- The Water Resources Plan will provide a roadmap for future planning efforts.
 - It will provide ‘off-ramps’, which are decision points at 10-year intervals where the Water Resources Plan can be compared against actual outcomes.
 - State water plans are challenging, therefore, we will rely heavily on input from stakeholders.

Plan Objectives (Slide 16)

- Sue Morea reviewed the Water Resources Plan objectives, which were developed early in the life of the Water Resources Plan. These were previously reviewed by the IATF.
 - Different stakeholder groups will have their own priority values.
 - Danny Flynn: Approves the presented objectives. From the well industry perspective, municipal groundwater users tend to be at odds with agriculture well users, as each are afraid the other will deplete the groundwater source. This was especially an issue in 2012.
 - Sue Morea: These objectives do compete, and the plan will attempt to be equitable to all objectives. It may be helpful to develop performance measures for each objective (e.g., a specific drought to plan for).
- Operational flexibility in Missouri likely means looking at modifying the operations of reservoirs to meet multiple uses.
- Cost effectiveness refers to addressing the ability to pay for clean water.
 - Leslie Holloway: Clarified rural residents are included in municipal/public supplies.
 - Sue Morea: Rewording the objectives is expected and has occurred in workgroups, and we may also add sub-objectives.

Project Communications (Slide 17)

- Sherri Stoner reviewed the Water Resources Plan communications.
 - The Plan will be reliant on technical workgroups to guide and fill data gaps.
 - Priority will be for water resources concerns.
 - The Department’s Water Resources Center webpage was recently updated to include information on the Water Resources Plan, including an informational brochure that can be printed. The brochure was distributed at this meeting. (Slide 18)
- The next IATF meeting is scheduled for May 31, 2018.
- Technical workgroups – notes from these meetings will be shared on the Department’s water plan webpage.
- The Department’s online collaboration tool, Basecamp, will be utilized for the technical workgroups. (Slide 19)

Outreach - Base Presentation (Slide 20)

- Base presentation contains 12 slides that provide an overview, goals, and objectives of the Water Resources Plan.



- The Department's Water Resources Center and CDM Smith will conduct training for 15 Soil and Water Conservation Program District Coordinators to provide a consistent message for dissemination.
- The Water Resources Center offered to IATF members to present on the water plan to their organization or other groups the IATF members recommend.

Missouri Water Resources Plan Brochure (Slide 21)

- Sherri Stoner noted that the Department, in conjunction with CDM Smith, has developed a brochure for the Water Resources Plan.

Technical Workgroup Meetings (Slides 22 and 23)

- Sherri Stoner provided the technical workgroup meeting dates and locations.

Water Demands: Consumptive and Non-Consumptive (Slide 26)

- Consumptive demands will be quantified, including:
 - Public water supply sources
 - Self-supplied nonresidential
 - Self-supplied domestic
 - Thermoelectric power
 - Livestock
 - Agriculture
- Non-consumptive demands will also be characterized, including:
 - Hydroelectric power generation
 - Commercial navigation
 - Habitat/wetlands
 - Thermoelectric power generation
- The consumptive demand analysis methodology will identify withdrawals and uses by sector, source, and county for existing conditions and will project usage through 2060.

Technical Workgroups – Status Update – Sue Morea (Slide 27 & 28)

- Jennifer Hoggatt noted that there will be two more technical workgroup meetings before the next IATF meeting; workgroup liaisons and the project team will report out to IATF.
- Workgroup members identified a spokesperson(s) from each of the technical workgroups.
- A roster of technical workgroup members was provided to the IATF members present.
- Technical workgroup spokespeople were identified and are the following:
 - Consumptive Needs
 - Roddy Rodgers, City Utilities of Springfield
 - Non-Consumptive Needs
 - Larry Helms, Missouri Canoe & Floaters Association (MCFA)
 - Lucy Fletcher, AgriServices and Inland Rivers, Ports, and Terminals
 - Water Quality
 - Charles Stevens, Kansas City Water Services
 - John Holmes, Allstate Consultants



- Infrastructure Needs
 - Curt Skouby, City of St. Louis Water
 - Tim Geraghty, Alliance Water Resources
- Agricultural Needs
 - Don Nikodim, Missouri Pork Association
 - Robert Brundage, Newman, Comley & Ruth P.C.

Supply - Matt Scott, CDM Smith (Slide 29)

- Task is to quantify and characterize available surface water. (Slide 30)
 - Review recent surface supply with USGS gage data.
 - Look at hydrologic variability, decision points.
 - Create water budgets for wet, dry, and average precipitation years.
- Methodology (Slide 31)
 - Complete an initial evaluation at the Hydrologic Unit Code (HUC)₄ level.
 - Complete a more detailed analysis if there are issues within a HUC₄ (identified by the surface water supply analysis or workgroups/IATF).
- Step 1: A data analysis effort will be completed first to help identify the appropriate tools to use for the analysis.
- Step 2: After tool selection, water budgets will be created and used to evaluate existing conditions and project supply through 2060 using climate variability scenarios.

Groundwater - Matt Scott, CDM Smith (Slides 32 and 33)

- Identify groundwater sources and limitations.
- Project likely scenarios.
 - Numerical models will be used where they are available.
 - Both the groundwater and surface water analysis will be reported according to HUC₄ boundaries to compare demands and lead into infrastructure task.
- Michele Helton: Asked will groundwater recharge scenarios be evaluated?
 - Mark McCluskey: We can look at specific areas, with varying climate scenarios (e.g., dry/wet) based on input from workgroups and the IATF.

Infrastructure – Todd Archer, CDM Smith (Slide 34)

- Methodology. (Slide 35)
 - Review and compile information from existing infrastructure databases.
- Approach. (Slides 36 to 38)
 - Working with other technical workgroups.
- This task will identify regional solutions and identify potential funding sources and mechanisms.
- Leslie Holloway: Asked will the East Locust Creek project be incorporated in the analysis?
 - Todd Archer: The project is projected to be constructed and operating by 2060, therefore it will be included.



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Non-Consumptive – Mark McCluskey, CDM Smith (Slide 39)

- Non-consumptive uses are thermoelectric and hydroelectric power generation, commercial navigation, and water-based outdoor recreation. (Slide 40)
- Reviewed the approach for non-consumptive demand, which included identifying major non-consumptive uses that are important sectors to the State, mapping locations of key usage and infrastructure, and formulating an outlook for the future. (Slide 41)
- Analysis will characterize the needs for each sector quantitatively for power generation and commercial navigation, and qualitatively for water-based outdoor recreation.

Agricultural – Sue Morea, CDM Smith (Slide 42)

- Agriculture in Missouri is currently a \$88.5 billion industry annually, projected to grow to \$175 billion.
- Task is led by University of Missouri professor Robert Kallenbach.
 - Agricultural demands are computed on a monthly timestep. (Slide 43)
 - Analysis includes Missouri's major crops. (Slide 44)
 - Grapes are included in 'orchard' category.
- Irrigated acres to be estimated based on crop and region. (Slide 45)
- Livestock water use demands will be estimated by county. (Slide 46)
 - Livestock using groundwater versus surface water will also be estimated.
- Danny Flynn: Uses by duck hunters may be overlooked. In Missouri, there are large areas that duck clubs inundate by pulling groundwater from shallow aquifers to create duck habitat.
 - Sue Morea: These are incorporated in the non-consumptive analysis.

Water Quality – Sue Morea, CDM Smith (Slides 47 to 50)

- Broad analysis intended to look at quality of water to be used for supply and recreation.
 - Water Resources Plan will not be a regulatory document.
 - Water quality regulations are done by a completely different program.
- The methodology will be data intensive, involving compiling water quality data from multiple sources including the Unified Watershed Assessment Plan.
- Atrazine to be added as a constituent in the analysis.

Role of the Interagency Task Force (IATF) (Slide 52)

- Jennifer Hoggatt noted that the IATF is a statutory responsibility. (Slide 52).
- Jennifer Hoggatt went through the role of the IATF:
 - Advise and provide guidance and direction on the Water Resources Plan.
 - Review draft work products.
 - Recommend delegates for technical workgroups.
 - Provide guidance and make recommendations on technical workgroup activity.

Path Forward

- CDM Smith to provide the Department meeting notes on technical workgroup and IATF meetings for review and posting on the Water Resources Plan website in two weeks.



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- Methodologies for each task are being finalized in conjunction with the Department and the U.S. Army Corps of Engineers.
- The next IATF meeting is scheduled for May 31, 2018, 9:00 a.m. to 12 p.m. (Slide 55)
- For the May 2018 IATF meeting, we will:
 - Present draft results on demands
 - Present draft results for the surface water supply analysis
 - Report on major infrastructure gaps identified

Meeting Adjourned (Slide 56)

Interagency Task Force Meeting Agenda

People requiring special services at the meeting can make arrangements by calling 1-800-361-4827 or 573-751-2867. Hearing and speech impaired individuals may contact the department through Relay Missouri, 1-800-735-2966. If you have questions regarding this meeting, please contact Sherri Stoner at sherri.stoner@dnr.mo.gov or 573-751-7823.

Date: Tuesday, Nov. 28, 2017, 9:00 a.m. to 12:00 p.m.

Location: Missouri Department of Natural Resources, Lewis and Clark State Office Building
1101 Riverside Drive, Jefferson City, MO 65102-0176

Meeting Agenda:

1. Welcome and Opening Remarks
2. Round Table Introductions
3. What is the Missouri Water Resources Plan
4. Water Plan Status Update
5. Technical Workgroups – Status Update
6. Role of the IATF
7. Question and Answer Session
8. Future Meeting – May 31, 2018, 9:00 a.m. to 12:00 p.m. at Lewis and Clark State Office Building, 1101 Riverside Drive, Jefferson City, Mo.
9. Adjourn



Interagency Task Force Meeting

November 28, 2017, 9:00 a.m. to 12:00 p.m.

Missouri Water Resources Plan

A dynamic, high-speed photograph of water splashing, creating a series of cascading droplets and ripples. The water is a vibrant blue, and the background is a lighter, pale blue. The image is split diagonally, with the darker blue splash on the left and the lighter blue background on the right.

Welcome!

Dru Buntin
Deputy Director
Missouri Department of
Natural Resources

Jennifer Hoggatt
Director
Water Resources Center

Introductions



A high-speed photograph of water splashing, creating a series of droplets and a flowing ribbon of water. The water is a vibrant blue color. The background is a light blue gradient with a diagonal split. The text is centered in the white area.

What is the Missouri Water Resources Plan

Missouri Water Resources Plan

- Statutory Responsibility (640.415 RSMo):

"The department shall develop, maintain and periodically update a state water plan for a long-range, comprehensive statewide program for the use of surface water and groundwater resources of the state, including existing and future need for drinking water supplies, agriculture, industry, recreation, environmental protection and related needs."



The background of the slide features a dynamic water splash in shades of blue and white, with droplets and ripples. The splash is positioned on the left side, with the water appearing to flow from the top left towards the bottom right. The right side of the slide is a solid light blue color, creating a clean, modern aesthetic.

Project Vision

The Missouri
Water
Resources Plan
is a long range,
comprehensive
strategy to:

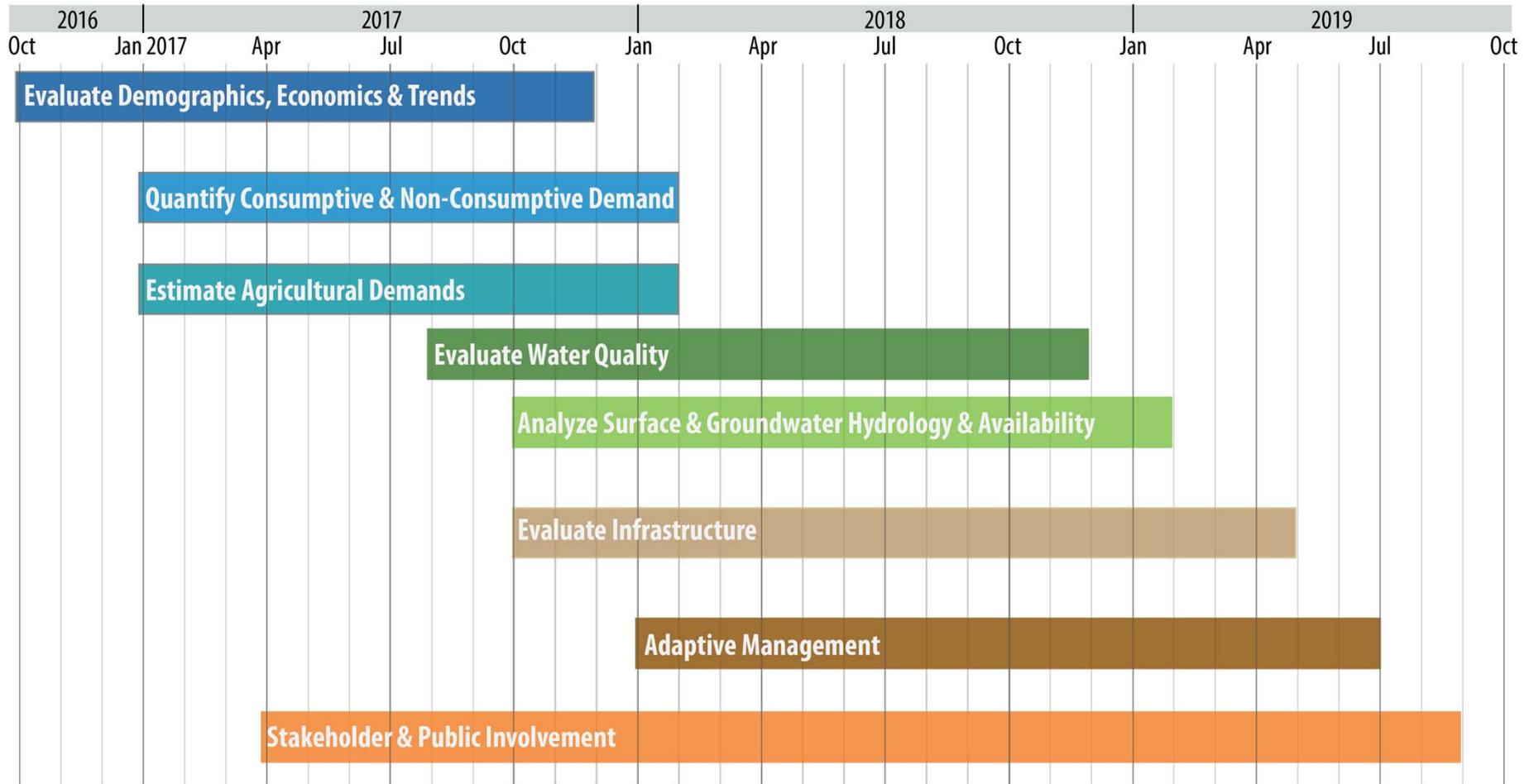
- Provide an understanding of water resource needs
- Ensure the quantity of water resources meet future water demands
 - Identify future water supply shortfalls
 - Explore options to address water needs

Missouri Water Resources Plan Update: Goals

- 1 Gather public and stakeholder input to help identify needs and priority areas of water resource development.
- 2 Establish key stakeholder advisory and technical groups to help guide water plan development.
- 3 Develop an updated evaluation of current groundwater and surface water availability and develop projected water supply needs.
- 4 Produce an in-depth analysis of current and future consumptive, non-consumptive and agricultural water needs, and identify gaps in water availability based on water demand projections.
- 5 Identify water and wastewater infrastructure needs, and evaluate funding and financing opportunities.
- 6 Recognize water quality and assess how this affects water supply uses.
- 7 Understand areas where developing new and more sustainable water sources, better infrastructure, and more integrated water supplies can help to sustain water delivery.
- 8 To better understand regionally where future water gaps may exist, as studies have revealed in parts of southwest and northern Missouri.



Missouri Water Resources Plan – Schedule



USACE Partnership – Planning Assistance to States

Authority
and Scope

- *Section 22 of the Water Resources Development Act (WRDA) of 1974, as amended, provides authority for the Corps of Engineers to assist the states, local governments, Native American Tribes and other non-federal entities, in the preparation of comprehensive plans for the development and conservation of water and related land resources.*



USACE Partnership (continued)

Planning Assistance to States Principles

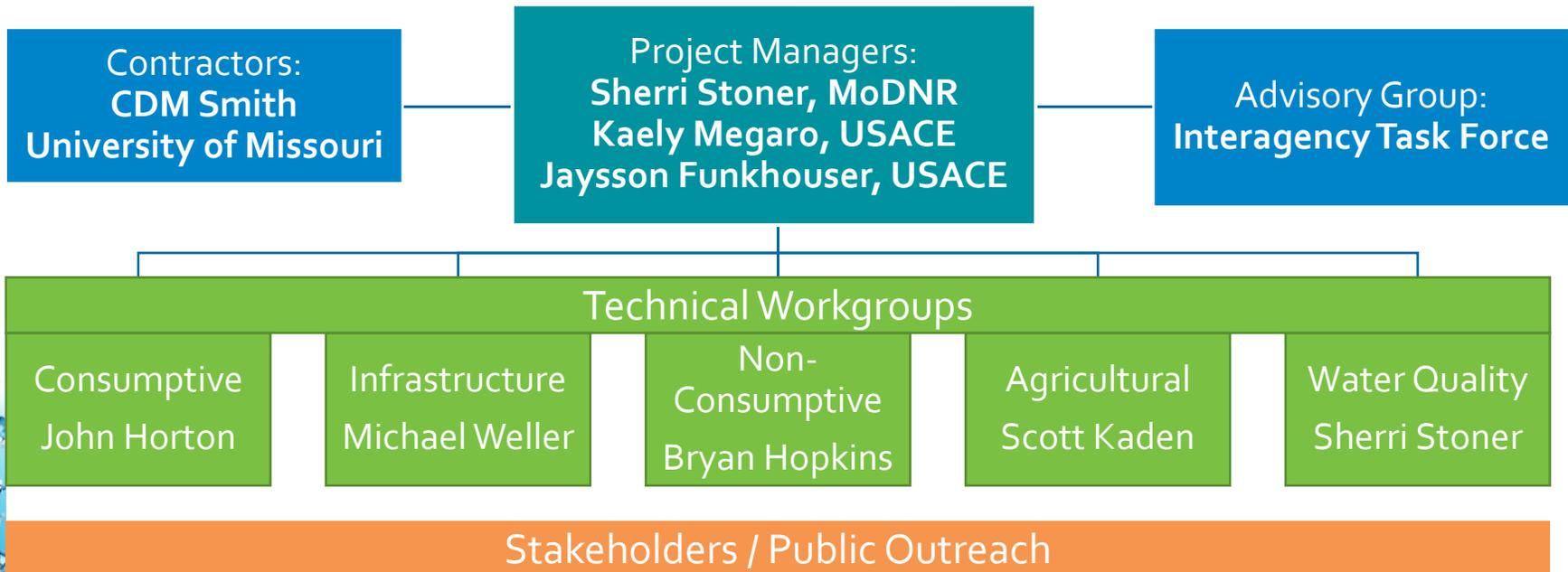
- Typical studies are undertaken only at the planning level of detail
- They do not include detailed design for project construction
- Broad coverage – “water and related resource” planning
- Cost shared 50/50 with state, Tribal or local government
 - In-kind services can be used to meet 100 percent of non-federal contribution
- Program annual ceiling is \$30 million nationally, and \$5 million per state



A high-speed photograph of water splashing, creating a series of droplets and a flowing ribbon of water. The water is a vibrant blue color. The image is split diagonally from the top-left to the bottom-right. The upper-left portion shows the main splash, while the lower-right portion shows a few individual droplets. The background is a light, neutral color.

Missouri Water Resources Plan – Status Update

Missouri Water Resources Plan Organization Chart



Water Resources Plan – Core Elements

Demands

Supply

Infrastructure

Water Quality

Public and Stakeholder
Involvement



Water Resources Plan – Elements Schedule

Evaluate Demographics, Economics and Trends

- Evaluate current and projected population and other key demographic factors
- Evaluate the role of water in major economic sectors
- Analyze the social setting surrounding water management

Quantify Consumptive and Characterizing Non-Consumptive Demand

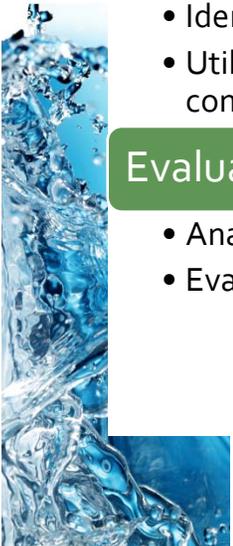
- Analyze demand studies and population estimates
- Estimate water resources sustainability and reliability
- Evaluate raw water providers production, wastewater treatment outfalls, reuse, conservation and efficiency, wholesale water contracts and direct flow storage
- Evaluate non-consumptive demands such as thermoelectric, navigation and water-based outdoor recreation

Estimate Agricultural Demands

- Identify/evaluate irrigated acreage, crop type and livestock
- Utilize methods for estimating consumptive use, gross diversions, return flows, losses and non-beneficial consumptive use

Evaluate Water Quality

- Analyze water quality and the impact on consumptive water supply
- Evaluate water quality for wastewater improvements



Water Resources Plan – Elements Schedule

Analyze Surface and Groundwater Hydrology and Availability

- Analyze river basin hydrology and reasonable variations in hydrology
- Track and account water transfers between uses and between watersheds
- Estimate aquifer capacity, yield, sustainability and suitability for aquifer storage/recharge

Evaluate Infrastructure

- Analyze infrastructure, conservation, system efficiencies, conjunctive use, transfers and development of new supplies
- Analyze options to meet identified management objectives
- Estimate capital, Operations and Maintenance, and periodic costs
- Evaluate alternative rates and fee structures, cost-benefit analysis and non-traditional innovative funding strategies

Adaptive Management

- Identify major uncertainties related to the future of water in the State of Missouri
- Evaluate multiple planning scenarios and identify decision points

Stakeholder and Public Involvement

- Implement technical workgroups
- Facilitate stakeholder involvement meetings
- Gather public input



Missouri Water Resources Plan Update: Define Water Supply Objectives



Sustainably
meet municipal and
industrial needs



Sustainably meet
agricultural needs



Provide operational
flexibility



Protect the
environment



Promote cost
effectiveness

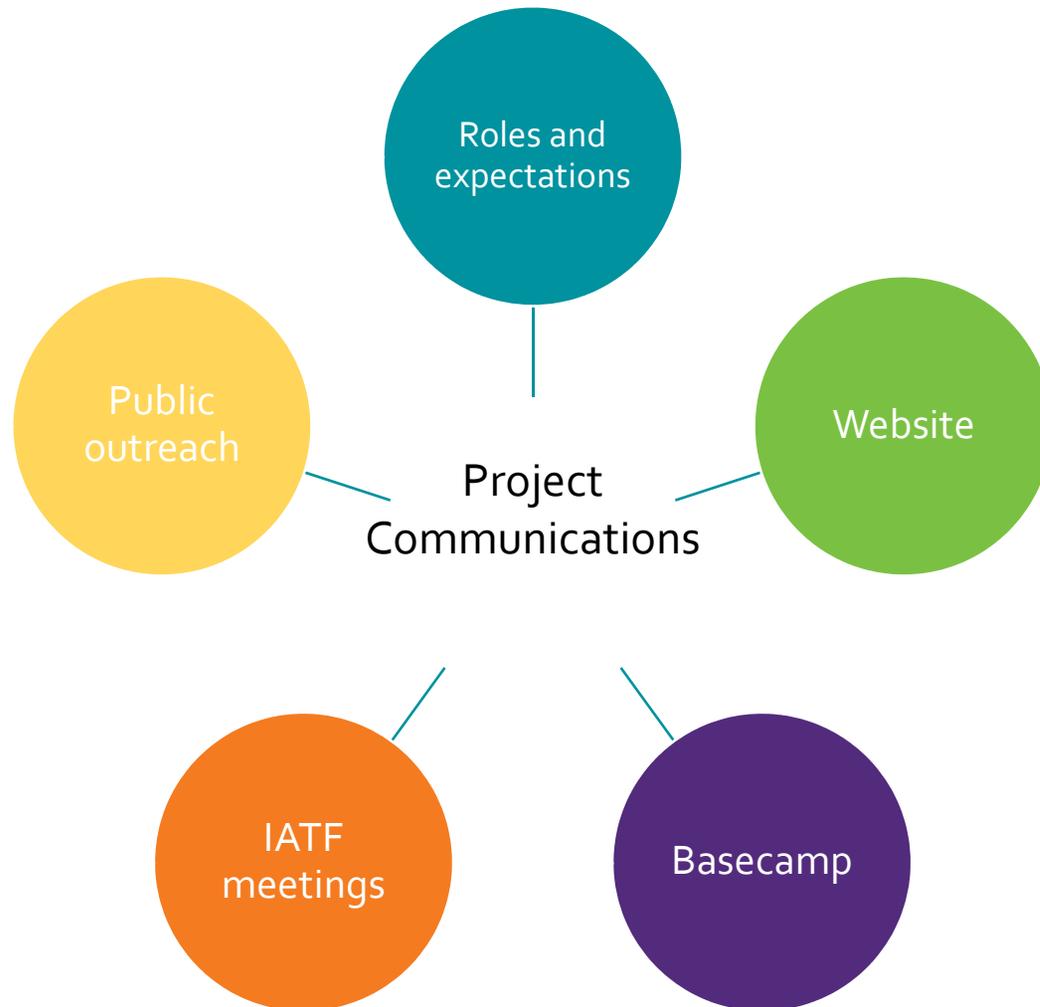


Identify water
quality impacts on
water supply uses



Educate and engage
residents, businesses and other
stakeholders in water planning to
2060

Project Communication



Missouri Water Resources Plan – Website

Missouri Water Resources Plan

Missouri's thousands of miles of rivers, streams and lakes, along with underground aquifers, supply our state's 6 million residents with water to drink and provide a crucial role in supporting outdoor recreation, industry and meeting our agricultural needs.

The Missouri Department of Natural Resources determined through previous water planning that water demands in certain areas of the state cannot be met long term, especially under drought conditions.

The Missouri Water Resources Plan will help to identify future shortfalls in water supplies, and explore options to address those water needs. This may include project recommendations such as new infrastructure development, regionalization of water use, integrating water supplies and pursuing financial assistance opportunities.

The department is directed by Missouri statutory law, **Section 640.415, RSMo**, to "... develop, maintain and periodically update a state water plan for a long-range, comprehensive statewide program for the use of surface water and groundwater resources of the state, including existing and future need for drinking water supplies, agriculture, industry, recreation, environmental protection and related needs ..." As such, the department has begun the process of updating the state water plan and anticipates completion of the plan by Fall 2019.

Water Resources Plan Goals & Objectives

Interagency Task Force

Water Plan Technical Workgroups

2003 State Water Resources Plan

Contact Information

Water Resources Plan Information
PO Box 176
Jefferson City, MO 65102
800-361-4827
573-751-2867
Email: [Contact Us](#)

Water Resources Plan Brochure
[11 x 17](#) | [8.5 x 11](#)

Report an Environmental Concern

dnr.mo.gov/mowaterplan/



Missouri Water Resources Plan – Basecamp

https://missouridepartmentofnaturalresources.basecampHQ.com/clients

Missouri Department of Natural Resources

Sherri Stoner | My info | Sign out | HELP

Dashboard To-Dos Calendar Time All People Search Templates Settings

Latest activity across your projects

Missouri Department of Natural Resources — Risk Management Committee

Comment	Re: Next Meeting 222	Posted by Stan P.	Jul 11	
Message	Next Meeting 222	Posted by Martin K.	Jul 11	
File	4-3-12 RMC Strategic Plan 2012-2020 Draft 1.02.docx	Uploaded by Stan P.	Apr 3	Jan 23
Message	Revision 1.02 to Strategic Plan	Posted by Stan P.	Apr 3	Aug 15
File	3-7-12 RMC Strategic Plan 2012-2020 Draft 1.01.docx	Uploaded by Richard S.	Apr 2	Aug 15

Missouri Department of Natural Resources — CCR

File	CCR White Paper 9-1-16.pdf	Uploaded by Scott W.	Sep 1	
Message	CQA Training opportunity	Posted by Scott W.	Aug 16	
File	Retrofit progress reports.pdf	Uploaded by Scott W.	Aug 10	Aug 10
				Aug 10
				Feb 3
				Feb 3

To-do

19. PDWB issue final approval of well & permit to dispense (for new water systems) TNC: Permitting, Construction & Certification Procedure	Assigned to Anyone	Jun 5
18. RO perform final well & water system inspection TNC: Permitting, Construction & Certification Procedure	Assigned to Anyone	Jun 5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

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Your projects

Missouri Department of Natural Resources

- [Agricultural Water Needs](#)
- [CCR](#)
- [Consumptive Water Needs](#)
- [Non-consumptive Water Needs](#)
- [Risk Management Committee](#)
- [Water and Wastewater Infrastructure Needs](#)
- [Water Quality as it Affects Availability](#)

MoDNR NERO PWS Wells

[Your archived projects](#)

[Recover your deleted projects](#)



Public Outreach – Base Presentation



The slide features a blue background with a water splash at the bottom. In the center, there is a circular logo containing a green map of Missouri. Below the logo, the word "MISSOURI" is written in large, bold, black letters, with a blue wave graphic under the 'I'. Underneath "MISSOURI", the words "WATER RESOURCES PLAN" are written in smaller, bold, black letters.

 **MISSOURI**
DEPARTMENT OF
NATURAL RESOURCES
Missouri Geological Survey

 **US Army Corps
of Engineers.**

Sherri Stoner, RG
Chief of Planning, Water Resources Center



Public Outreach – Brochure

Missouri Department of Natural Resources

Water Resources Center

- ◆ Performs water supply analysis, drought assessments, flood and hydrology studies, and analysis of water use data.
- ◆ Monitors surface and groundwater quantity.
- ◆ Operates and maintains a groundwater level observation well network.
- ◆ Engages in state water planning efforts.
- ◆ Maintains a database of information from registered major water users.
- ◆ Administers interstate water compacts and agreements.



To learn more about the Missouri Water Resources Plan visit dnr.mo.gov/mowaterplan

If you would like assistance or have questions, please contact the Water Resources Center at 573-751-2867, or by email at mowaterplan@dnr.mo.gov

Missouri Department of Natural Resources
Missouri Geological Survey
Water Resources Center
 PO Box 176
 Jefferson City, MO 65102



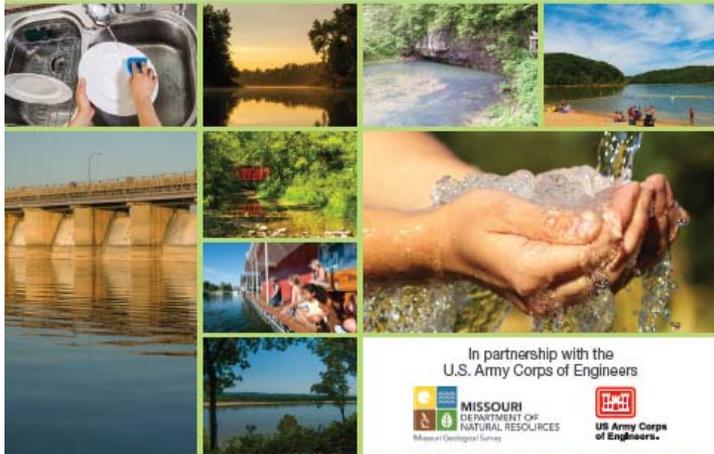
Missouri Water Resources Plan

The Missouri Water Resources Plan is a long-range, comprehensive strategy to provide an understanding of our water resource needs. It will help ensure the quantity of Missouri's water resources will meet our future demands by identifying future shortfalls in water supplies, and exploring options to address those water needs.

Planning is critical to identify water needs now and for the future. It prepares us for water delivery in the face of stresses on supply caused by situations, such as drought and increasing demand. It is imperative we look to the future and prepare for our water needs.

Missouri Water Resources Law

Missouri Water Resources Law (Section 640.415, RSMo) requires the Department of Natural Resources to develop, maintain and periodically update a state water plan to ensure Missouri's water resources needs will be met.



In partnership with the U.S. Army Corps of Engineers



11.00 x 8.50 in

PUB2698 10/2017



Technical Workgroups – Initial Meetings

**November 14-16, 2017, in Roaring River Conference Room,
1730 East Elm Street, Jefferson City**

Nov. 14 9 a.m. to 12 p.m. – Consumptive Needs

1 p.m. to 4 p.m. – Infrastructure Needs

Nov. 15 9 a.m. to 12 p.m. – Non-Consumptive Needs

1 p.m. to 4 p.m. – Agricultural Needs

Nov. 16 9 a.m. to 12 p.m. – Water Quality Needs



Technical Workgroups – Future Meetings

February 6-8, 2018, 1730 East Elm Street, Jefferson City

- Feb. 6 9 a.m. to 12 p.m. – Consumptive
 1 p.m. to 4 p.m. – Infrastructure
- Feb. 7 9 a.m. to 12 p.m. – Non-Consumptive
- Feb. 8 9 a.m. to 12 p.m. – Water Quality
 1 p.m. to 4 p.m. – Agriculture

May 15-17, 2018, Lewis and Clark State Office Building, Jefferson City

- May 15 9 a.m. to 12 p.m. – Consumptive
 1 p.m. to 4 p.m. – Infrastructure
- May 16 9 a.m. to 12 p.m. – Non-Consumptive
 1 p.m. to 4 p.m. – Agriculture
- May 17 9 a.m. to 12 p.m. – Water Quality

August 14-16, 2018, Lewis and Clark State Office Building, Jefferson City

- Aug. 14 9 a.m. to 12 p.m. – Consumptive
 1 p.m. to 4 p.m. – Infrastructure
- Aug. 15 9 a.m. to 12 p.m. – Non-Consumptive
 1 p.m. to 4 p.m. – Agriculture
- Aug. 16 9 a.m. to 12 p.m. – Water Quality



The background of the slide is a high-speed photograph of water splashing, creating a dynamic, blue-toned scene with various droplets and ripples. The image is split diagonally from the top-left to the bottom-right, with the water splash occupying the left and bottom-right portions, and a light grey background occupying the top-right portion. The text is centered in the grey area.

Technical Workgroups Status Update

The background of the slide is a high-speed photograph of water splashing, creating a series of droplets and a flowing ribbon of water. The water is a vibrant blue color. The image is split diagonally from the top-left corner to the bottom-right corner. The upper-left portion is a darker blue, while the lower-right portion is a lighter, sky-blue. The text is centered in the white area on the right side of the diagonal.

Consumptive Needs Technical Workgroup

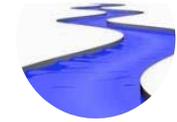
ALL WATER DEMAND SECTORS

Consumptive Demand Quantified



- Municipally-provided public supply
- Self-supplied nonresidential
- Self-supplied domestic
- Thermoelectric power generation (small portion consumed)
- Livestock
- Agriculture irrigation

Non-Consumptive Demand Characterized

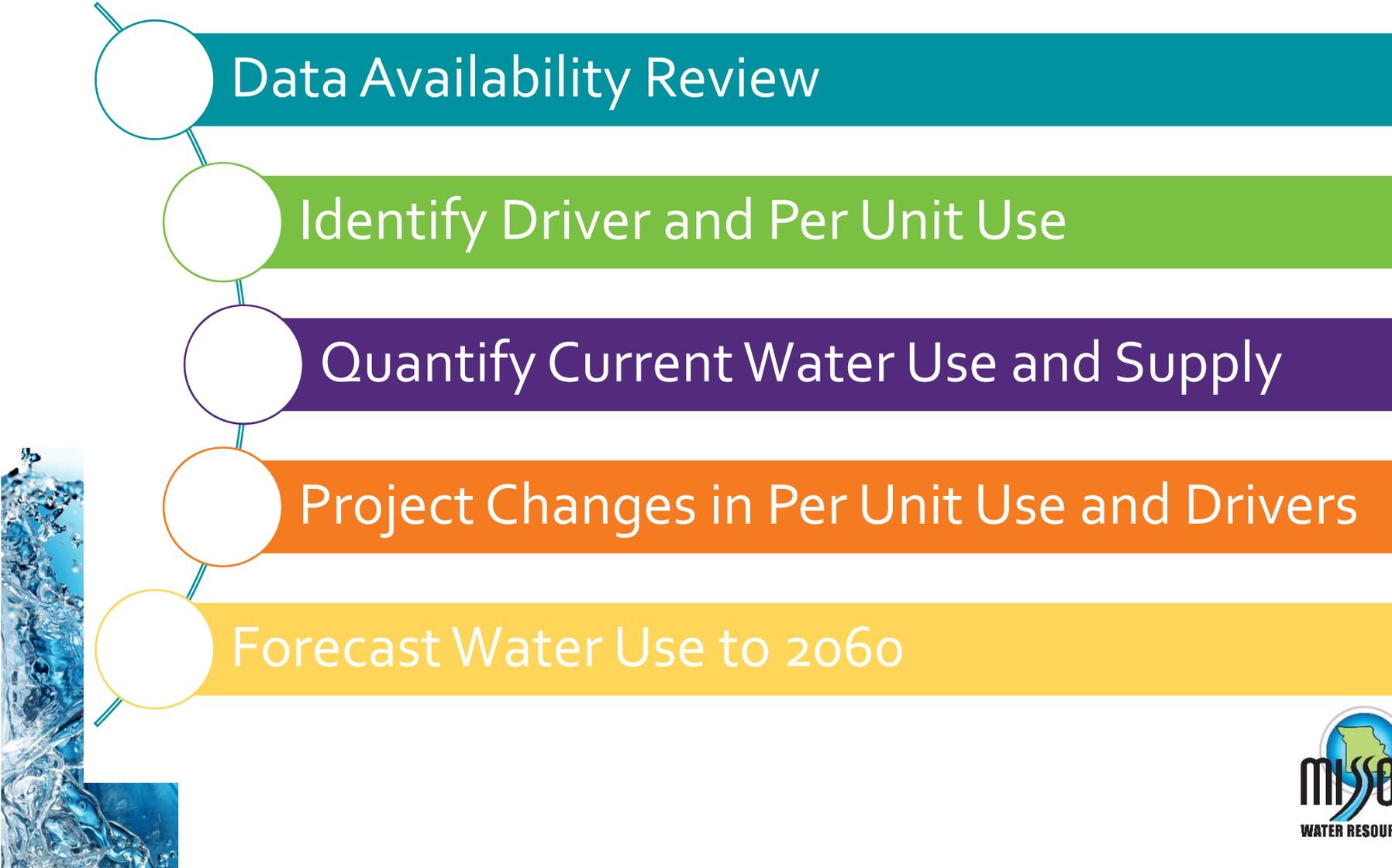


- Hydroelectric power generation
- Commercial navigation
- Aquaculture and wetlands
- Water-based outdoor recreation
- Thermoelectric power generation (small portion consumed)

Consumptive demand refers to water that is withdrawn from the source and consumed in a way that makes its use all or partially unavailable for other purposes or uses.



Consumptive Demand Approach



Data Availability Review

Identify Driver and Per Unit Use

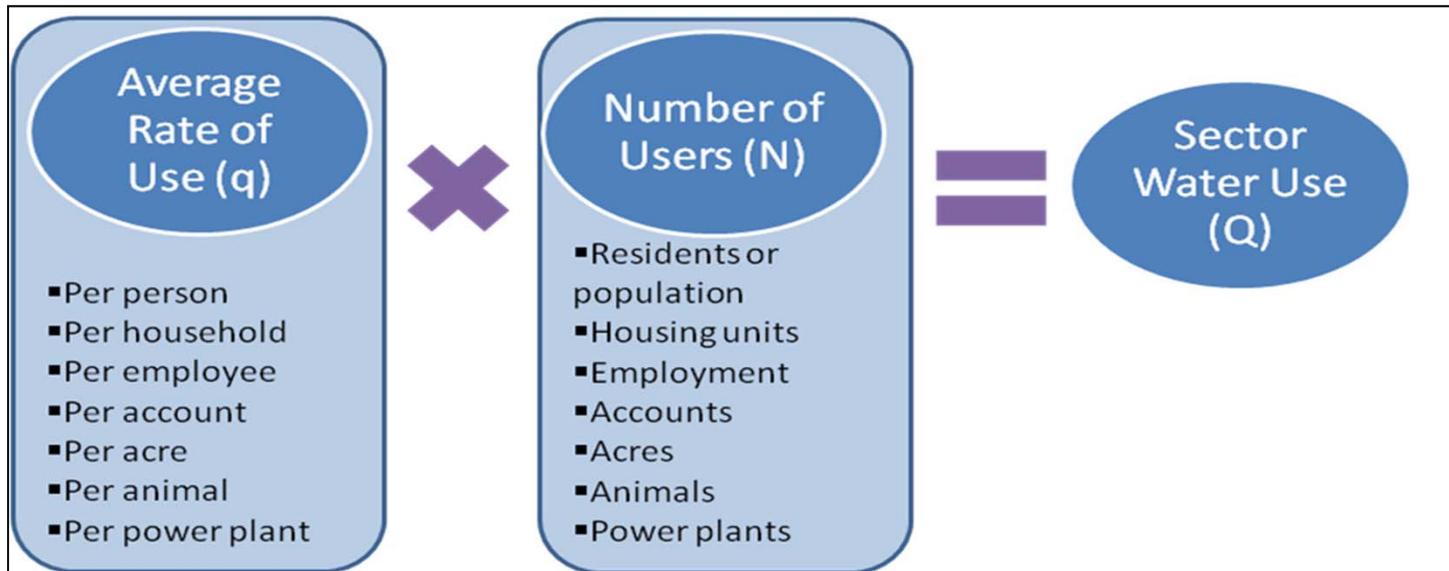
Quantify Current Water Use and Supply

Project Changes in Per Unit Use and Drivers

Forecast Water Use to 2060

Consumptive Demand

Overview of Demand Forecasting Methodology



GOAL: identify withdrawals and consumptive use by sector, source and county to 2060



Supply Availability



Surface Water Supply Task Summary

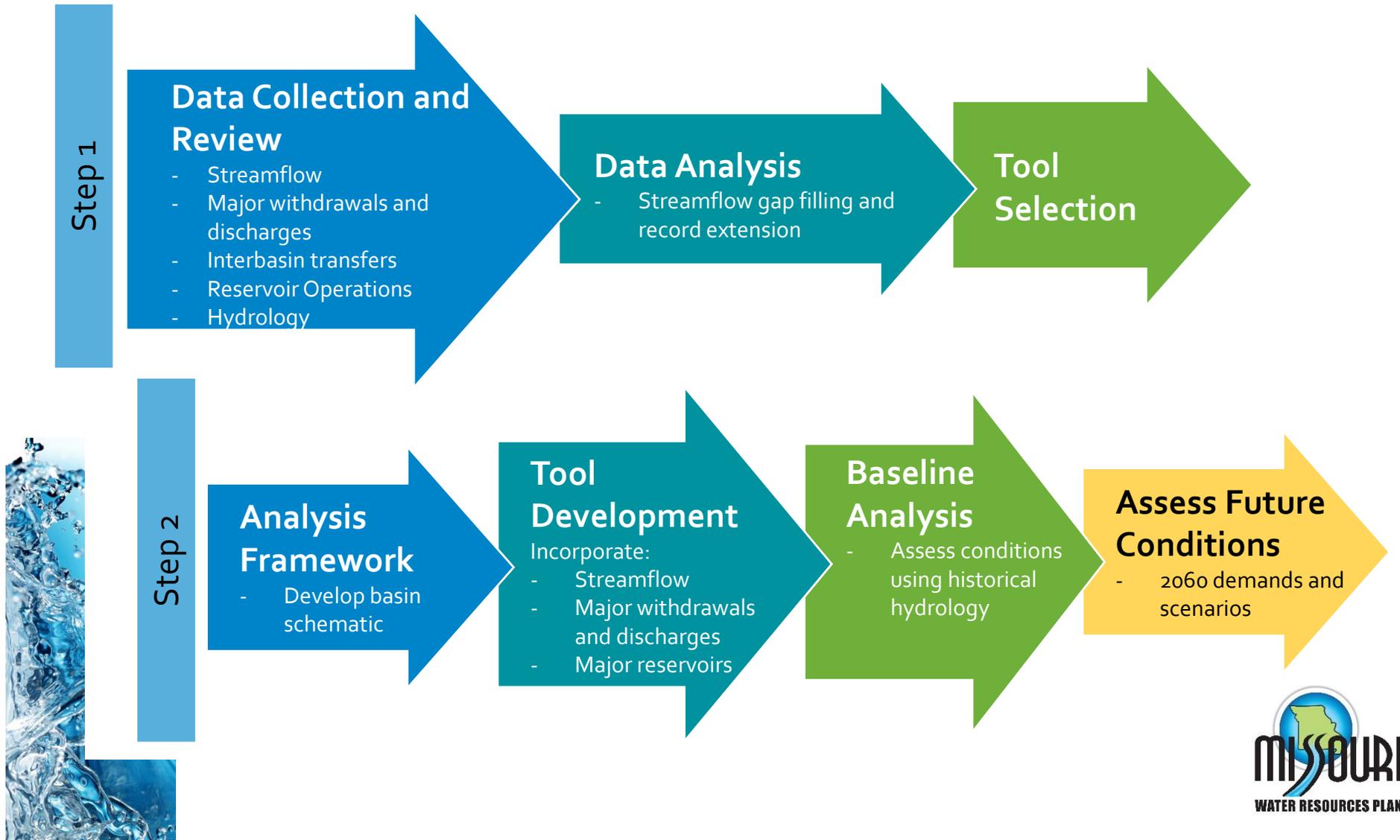
Goals

- Identify and quantify existing and future surface water supply sources
- Assess water supply availability accounting for future demands and hydrologic variability scenarios
- Summarize USACE reservoir allocations

Elements

- Develop and apply tools to support surface water analysis
- Develop water budgets to determine water availability under dry, normal and wet conditions

Surface Water Methodology Overview



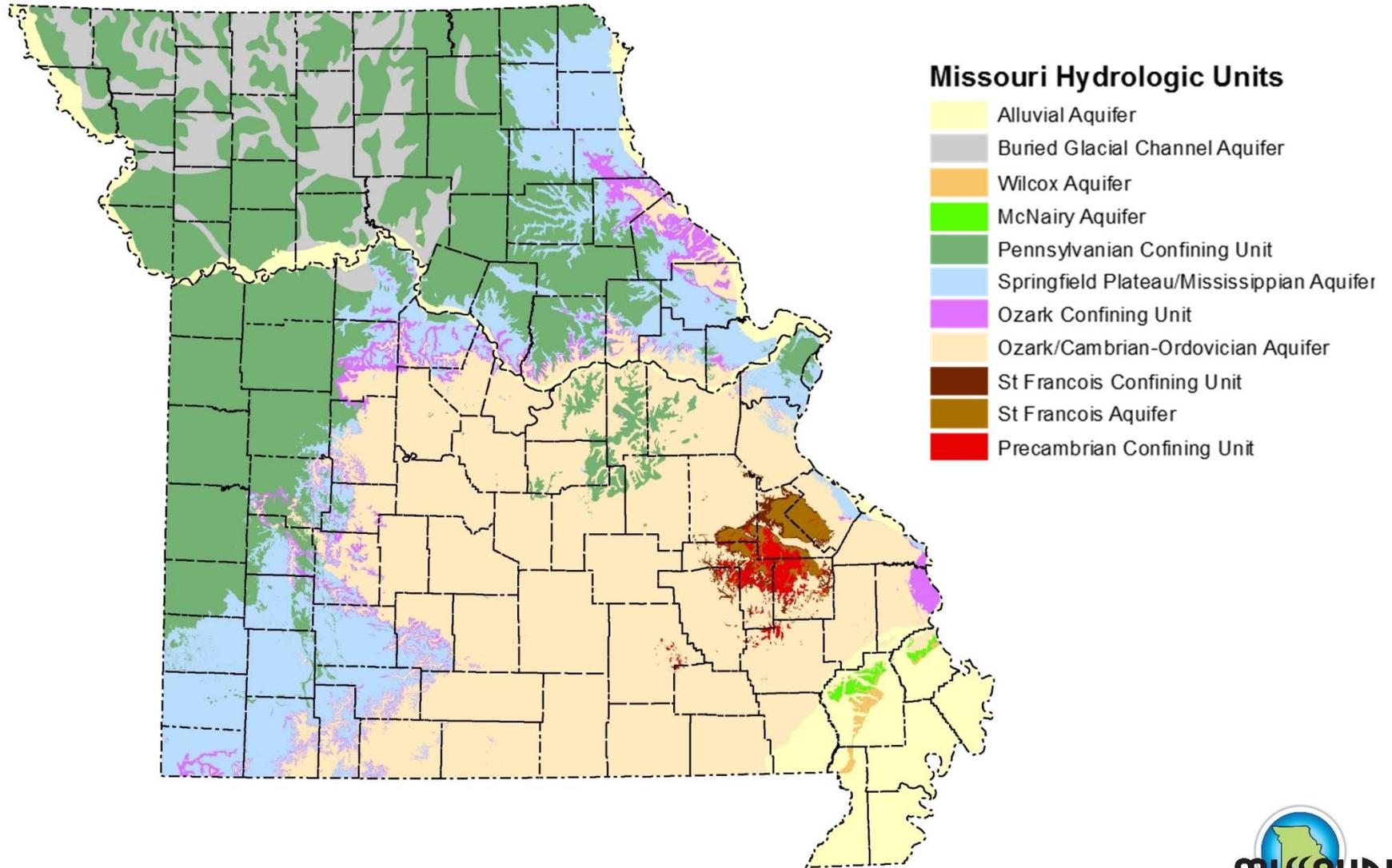
Overview of Groundwater Approach

Goals:

- Identify sources and limitations of groundwater in Missouri
- Project the most likely future conditions and availability of groundwater
- Integrate groundwater analysis into the broader supply analysis



Groundwater in Missouri

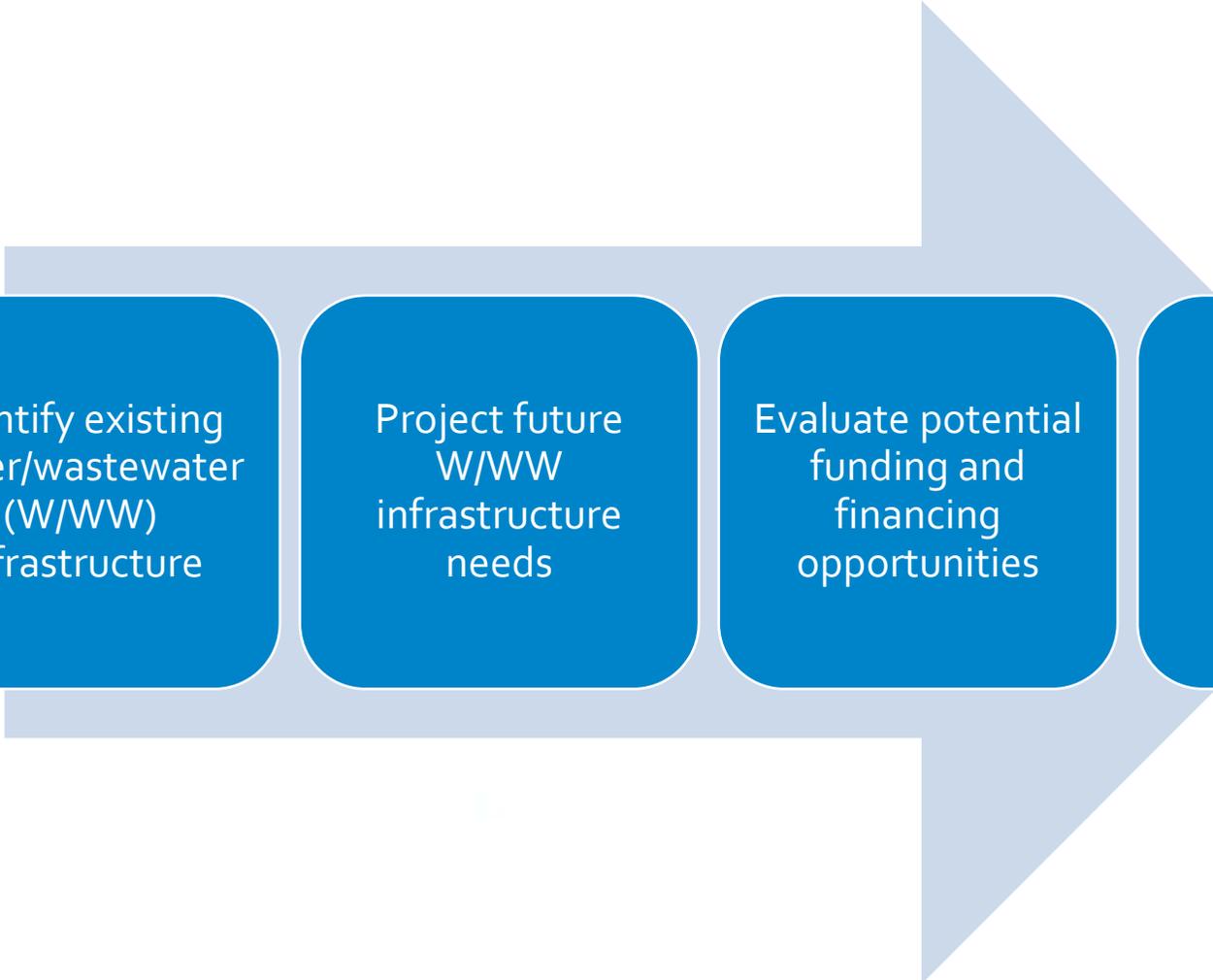


A large, dynamic splash of clear water against a bright blue background, occupying the left and bottom-left portions of the slide. The water is captured in mid-air, creating a series of peaks and valleys with visible droplets and ripples.

Infrastructure Needs Technical Workgroup



Infrastructure Methodology Overview



Identify existing
water/wastewater
(W/WW)
infrastructure

Project future
W/WW
infrastructure
needs

Evaluate potential
funding and
financing
opportunities

Document
findings



Infrastructure Methodology Approach

- Identify Potential Impacts to Future Water and Wastewater Infrastructure
 - Demands and source water availability
 - Coordinate with task leads for demands and supply technical workgroups
 - Water quality impacts
 - Drinking water
 - Source water
 - Disinfection by-products
 - Radionuclides (prevalent in southwest Missouri)
 - Wastewater
 - Disinfection indicating organism, e.g., bacteriophage
 - Short-term: Draft ammonia standards for MoDNR
 - Long-term: Total nitrogen and phosphorus
 - Input from technical workgroup

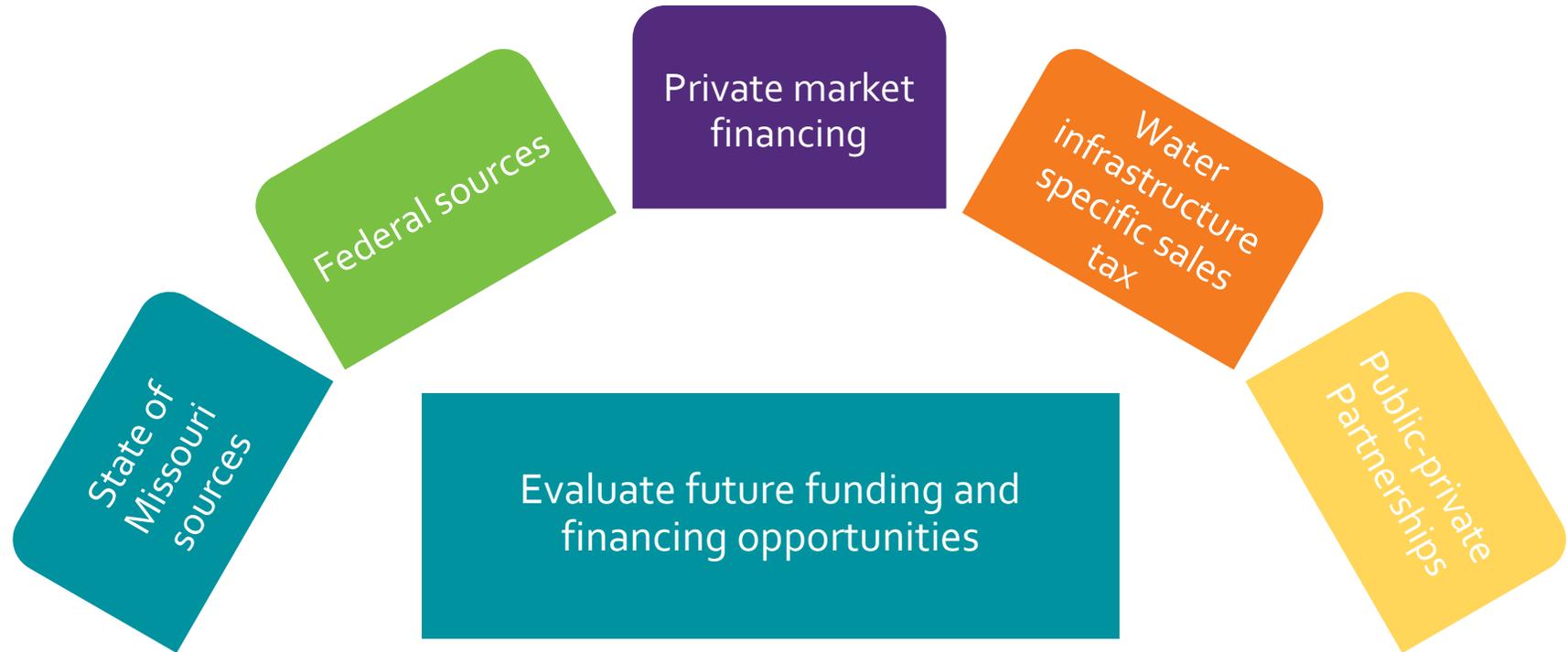


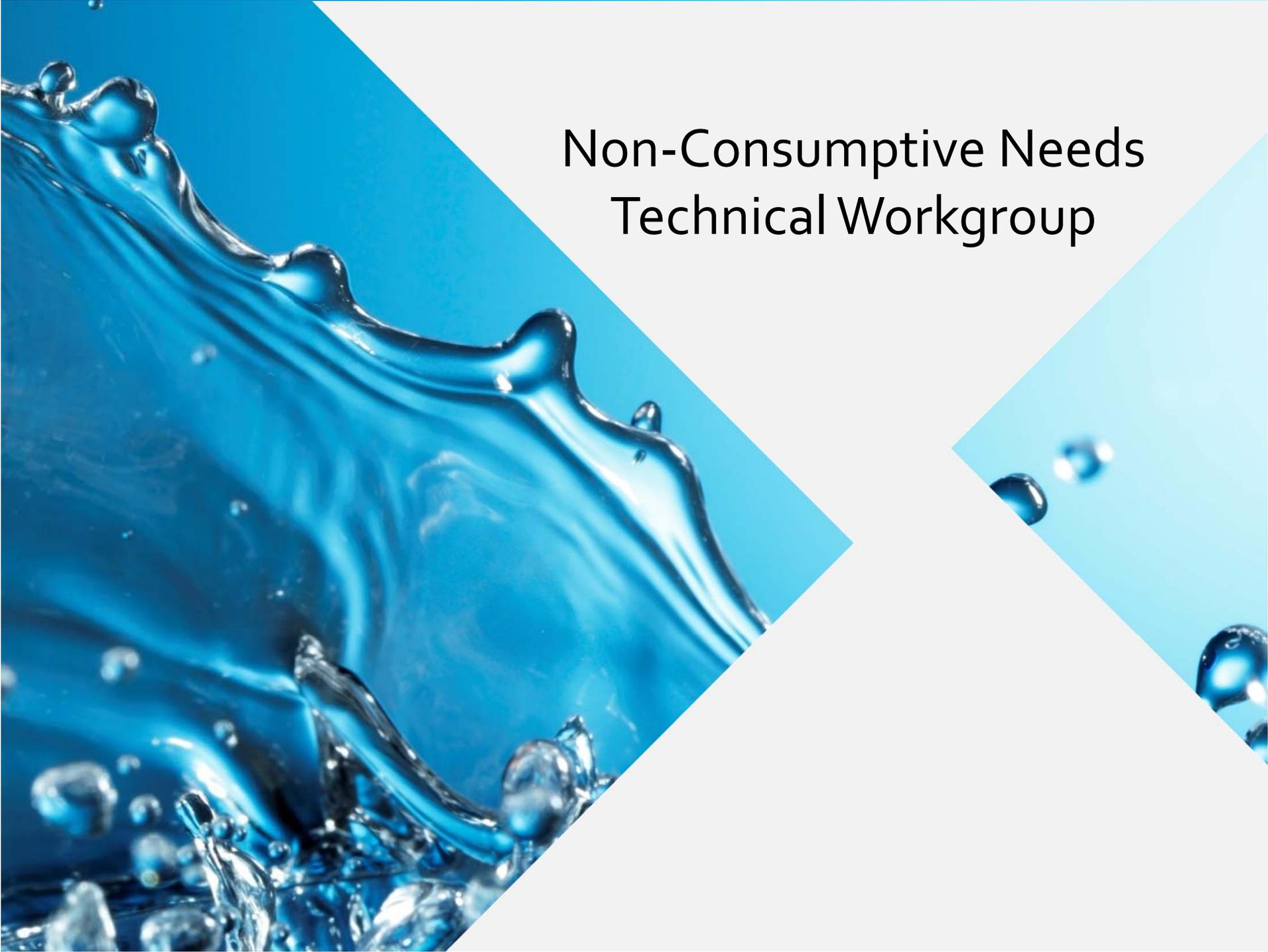
Infrastructure Methodology Approach

- Identify Future Regional Infrastructure Solutions
 - Based on gap analysis
 - Reconnaissance level analysis
 - Large-scale projects



Infrastructure Funding



The background of the slide is a high-speed photograph of water splashing, creating a series of droplets and a flowing ribbon of water. The water is a vibrant blue color. The image is split diagonally from the top-left to the bottom-right. The upper-left portion shows the main splash, while the lower-right portion shows a smaller, more distant splash. The remaining area is a plain light grey.

Non-Consumptive Needs Technical Workgroup

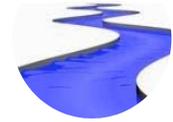
ALL WATER DEMAND SECTORS

Consumptive Demand Quantified



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- Agriculture irrigation

Non-Consumptive Demand Characterized



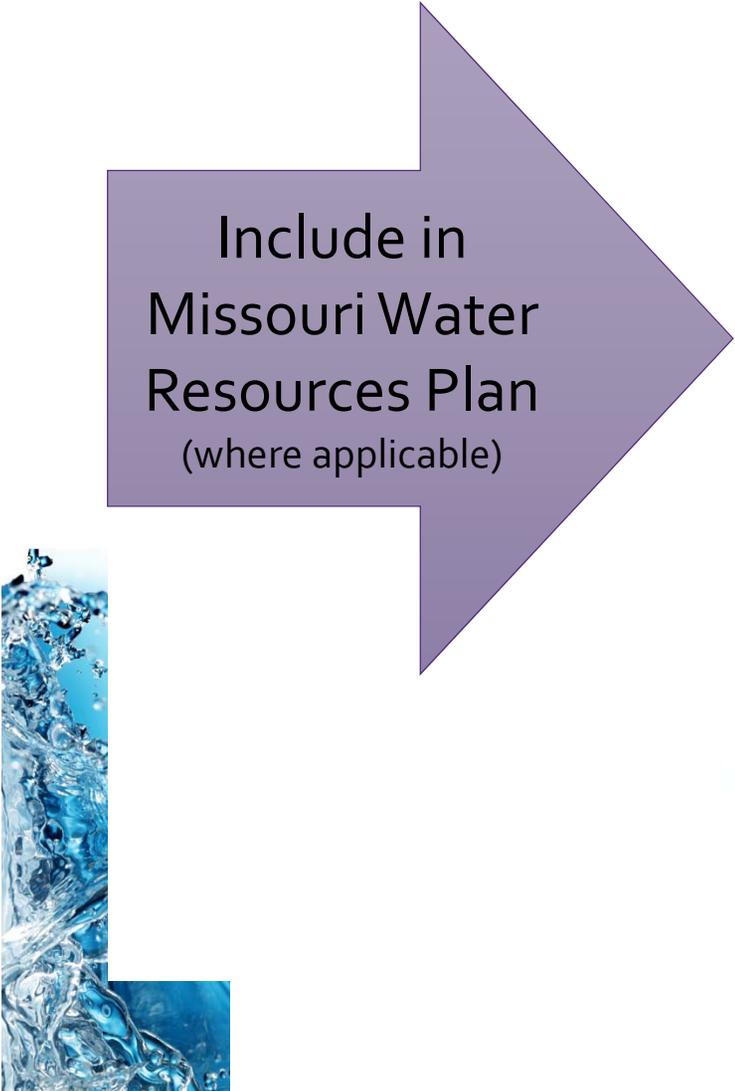
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- Thermoelectric power generation (small portion consumed)

Consumptive demand refers to water that is withdrawn from the source and consumed in a way that makes its use all or partially unavailable for other purposes or uses.



Non-Consumptive Demand

Overview of Approach



Include in
Missouri Water
Resources Plan
(where applicable)

How water is used

What activities does water support

Importance of sector to the state

Quantify water needs

Map locations of key use and
infrastructure

Future outlook

Identify data gaps and needs

The background of the slide is a light gray color. On the left side, there is a large, diagonal, triangular graphic element containing a high-speed photograph of water splashing. The water is captured in mid-air, creating a series of droplets and a flowing ribbon of liquid. The color of the water is a vibrant blue. On the right side, there is another smaller, diagonal, triangular graphic element, also containing a high-speed photograph of water splashing, similar to the one on the left, but with a lighter blue color scheme. The text "Agricultural Needs Technical Workgroup" is centered in the upper right quadrant of the slide, in a black, sans-serif font.

Agricultural Needs Technical Workgroup

Objectives

- Evaluate historical monthly water use of livestock and irrigated crops by county in the State of Missouri
- Project the monthly volume of water needed for irrigation and livestock for each county to 2060



Crops Included in Study

- Grain Corn
- Soybean
- Cotton
- Rice
- Silage Corn
- Hay
- Sorghum
- Wheat
- "Vegetables"
- "Orchards"
- Sod
- Grass Seed

* "Berry" category removed due to very low (<300) acreage and limited spatial data



Estimating Irrigated Acres

- Confirm crop acreages and explore datasets regarding percentage of irrigated acres for each crop by county
- Using the county data available, calculate the average percentage of irrigated acres by crop and region
- If county is missing irrigated acres for a crop, estimate using the total acres and regional crop average



Livestock Water-Use Estimation Procedure

- Estimate the livestock number for each county
- Estimate the average daily water use for each livestock category
- Multiply average daily water use by number of days water was used to get annual water use
- Estimate the percentage of groundwater versus surface water for livestock water use by county



The background of the slide is a dynamic water splash in shades of blue. The splash originates from the bottom left and moves towards the top right, creating a sense of motion. The water droplets are captured in mid-air, with some appearing as sharp spheres and others as elongated, flowing streams. The lighting highlights the surface tension and the clarity of the water. The splash is set against a light blue background that transitions into a white area where the text is located.

Water Quality Technical Workgroup

Water Quality Task Summary

Goals

- Recognize water quality and assess how this affects water supply uses

Elements

- Analyze statewide water quality and the impact on consumptive water supplies
- Evaluate water quality for assessment of wastewater improvements

Considerations

- Not intended as a regulatory plan
- Water quality regulations are authorized under different regulatory statutes than those that authorize the development of the statewide water resources plan

Water Quality Impacts on Supply Sectors



Water Use Sector	Water Needs	Water Quality Considerations
Industrial	Variety of industrial processes, mining, and natural gas extraction.	Chemicals in water can affect industrial processes, machinery, and cooling systems.
Agricultural	Crops and livestock.	High levels of some metals or chloride (salt) in water can inhibit plant growth. Chemicals and pathogens in water can cause illness in livestock.
Drinking water	Adequate water for drinking is essential for human health.	Chemicals and pathogens in water can cause illness in humans. Nutrients in drinking water reservoirs can cause blooms of algae that lead to problems with water filtration, taste and odor and toxins; and increase disinfection byproduct precursors.
Recreation	Boating, swimming, etc.	Pathogens and chemicals in water can make recreational users ill. Water quality can affect aesthetics and desirability for recreation.
Fish and wildlife support	Fish and wildlife communities.	Pathogens, nutrients, and other chemicals in water can cause illness in aquatic organisms directly or indirectly by causing changes in water chemistry, such as pH or dissolved oxygen levels.

Water Quality Methodology Overview



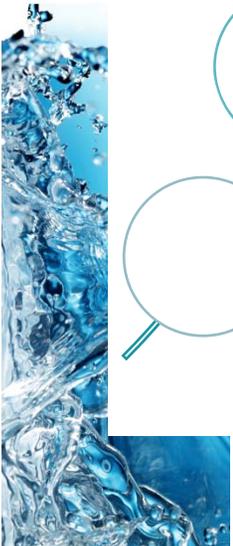
Data Compilation

Summarize Current Statewide Water Quality

Assess Spatial Trends and Identify Regional Areas of Concern

Assess Trends in Water Quality Over Time

Provide Additional Water Quality Discussion





Introduction of Technical Workgroups Spokesperson

Role of the Interagency Task Force

- Statutory Responsibility (640.430 RSMo):

"The department shall establish an interagency task force consisting of the departments of health and senior services, conservation, agriculture, the University of Missouri, college of agriculture and such other departments and agencies as may be necessary to effectuate the purposes and provisions of sections 640.400 to 640.435."



Role of the Interagency Task Force

- To serve in an advisory capacity providing guidance and direction on the water plan efforts, and make water resources project recommendations.
- Review draft work products for inclusion in the Missouri Water Resources Plan.
- Recommend delegates for technical workgroups.
- Provide guidance and make recommendations on technical workgroup(s) activity.
- Means of providing open communication among all stakeholder members to get the best outcomes and planning of our water resources.



Question and Answer Session



Next Interagency Task Force Meeting

May 31, 2018

9:00 a.m. to 12:00 p.m.

Lewis and Clark State Office Building,
Jefferson City



Thank You

